REMARKS

The Examiner's communication dated January 30, 2009 has been received and carefully considered. Claims 11-18 and 20-28 are currently pending in the application.

Reexamination and/or reconsideration of the application as amended are respectfully requested.

I. The Office Action

Claims 11-14 and 17-18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Zuyev et al. (Optimization Injection Gate Location and Cycle Time for the In-Mold Coating (IMC) Process, Antec 2001, 195) (hereinafter "Zuyev"), in view of Chen et al. (In-Mold Functional Coating of Thermoplastic Substrate: Process Modeling, Antec 2001, 255) (hereinafter "Chen"), and Navti et al. (Finite Element Modeling of Surface Tension Effects Using a Lagrangian-Eulerian Kinematic Description, 0045-7825/97, 1997 Elsevier Science S.A.) (hereinafter "Navti").

Claims 15-16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Zuyev in view of Chen and Navti as applied to claim 13, and further in view of Walsh, U.S. Patent No. 6,099,162 (hereinafter "Walsh").

Claims 20, 22-24 and 27-28 are rejected under 35 U.S.C. § 103(a) as being anticipated by Zuyev in view of Chen.

Claim 21 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Zuyev in view of Chen as applied to claim 20, further in view of Ladeinde (A Procedure for Advection and Diffusion in Thin Cavities, Computational Mechanics 15 (1995) pp. 511-520, Springer-Verlag, 1995).

Claims 25-26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Zuyev in view of Chen as applied to claim 23, and further in view of Walsh.

II. Rejection of Claims 11-14 and 17-18 Under 35 U.S.C. 103(a)

Claims 11-14 and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zuyev et al. (Optimization Injection Gate Location and Cycle Time for the In-Mold Coating (IMC) Process, Antec 2001, 195) (hereinafter "Zuyev"), in view of Chen et al. (In-Mold Functional Coating of Thermoplastic Substrate: Process Modeling, Antec 2001, 255) (hereinafter

"Chen"), and Navti et al. (Finite Element Modeling of Surface Tension Effects Using a Lagrangian-Eulerian Kinematic Description, 0045-7825/97, 1997 Elsevier Science S.A.) (hereinafter "Navti"). Applicants respectfully traverse the rejection for at least the following reason. Zuyev in view of Chen and Navti do not, individually or in combination, teach or suggest the subject claims.

Claim 11 recites a method for optimizing the location of an in-mold coating injection port in a mold so as to minimize the flow time for an in-mold coating composition to flow over at least a part of a molded article, said method comprising the steps of: predicting a coating composition fill pattern in said mold; using said pattern to determine optimal placement of a coating injection nozzle so as to minimize the flow time for an in-mold coating composition to flow over at least a part of a molded article and to reduce the presence of surface defects of a coating formed from said in-mold coating composition; placing said injection nozzle in said optimal placement position, and using said method in conjunction with a method to minimize a cure time of the in-mold coating composition. Zuyev, Chen and Navti do not, independently or in combination, teach or suggest the invention as set forth in the subject claims.

Particularly, Zuyev does not teach or suggest the step of using the fill pattern to determine optimal placement of a coating injection nozzle so as to minimize the flow time for an in mold coating composition to flow over at least a part of a molded article. Zuyev is directed to minimizing cure time, not flow time. (See Abstract and page 2, col. 2, paragraphs 1 and 2). Zuyev teaches, "it is important to minimize cure time while allowing sufficient time for the material to completely cover the part (i.e. flow time)." Zuyev further explains that the process is to minimize cure time given a determined flow time. (page 2, col. 2, paragraph 2). The programming model taught in Zuyev contains the metamodel of the cure time as a function of the catalyst level and the wall temperature as the objective function to be minimized. The expression of t_c (cure time) was used as the objective function to be minimized subject to t_f (flow time) being larger than or equal to 10, 20 and 30 seconds. The t_f values were typical for a small hood, a large hood, and big truck hood respectively. Therefore, t_f was clearly not the objective to be minimized as asserted by the Examiner.

The Examiner acknowledges that neither Zuyev nor Chen teach the step of using a finite difference method comprising the steps a), b), c) and d) as recited in the claimed invention. However, the Examiner asserts that Navti teaches using a finite difference method in determining

between pressure in a mold and a flow rate of the coating composition and solving iteratively. According to the Examiner, it would have been obvious to one of ordinary skill in the art to combine the teachings of Zuyev, Chen and Navti, since Navti's teachings would have provided ease of implementation and accuracy, especially with regard to two dimensional flow problems. Applicant disagrees.

Navti teaches an algorithm to model surface tension forces during fluid motion. The model described is the Lagrangian-Eulerian method that determines localized surface force acting in the normal direction to the free surface. Although Navti does implement the flow velocity and pressure, Navti's method does not result in predicting a coating composition fill pattern. Rather, it is used to determine surface tension. Moreover, Navti does not obtain the coating composition thickness distributions for the mold, as is described in the present claims. As such, combining the teachings of Navti with that of Chen and Zuyev would not result in the present invention as described in the subject claims.

For at least the reasons set forth above, Zuyev in view of Chen and Navti does not, individually or in combination, teach or suggest the subject invention as recited in independent claim 11, along with claims 12-14 and 17-18 that depend therefrom. As such, Applicant respectfully requests withdrawal of the rejection.

III. Rejection of Claims 15-16 Under 35 U.S.C. 103(a)

Claims 15 and 16 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Zuyev in view of Chen and Navti as applied to claim 13 above, and further in view of Walsh (U.S. Patent 6,099,162). Applicant asserts that claims 15 and 16 depend from, and include all the limitations of independent claim 11. Walsh does not make up for the aforementioned deficiencies with regard to claim 11. Accordingly, Applicant respectfully requests the rejection of claims 15 and 16 be withdrawn.

IV. Rejection of Claims 20, 22-24 and 27-28 Under 35 U.S.C. 103(a)

Claims 20, 22-24 and 27-28 are rejected under 35 U.S.C. § 103(a) as being anticipated by Zuyev in view of Chen. Applicant respectfully traverses the rejection for at least the following reason. Zuyev in view of Chen does not, individually or in combination, teach or suggest the subject claims.

Independent claim 20 recites a method for optimizing the location of an in-mold coating injection port in a mold so as to minimize the flow time for an in-mold coating composition to flow over at least a part of a molded article. The method includes the steps of predicting a coating composition fill pattern in said mold over at least a two dimensional surface; using the pattern to determine optimal placement of a coating injection nozzle so as to minimize the flow time for an in-mold coating composition to flow over at least a part of a molded article and to reduce the presence of surface defects of a coating formed from said in-mold coating composition; placing the injection nozzle in the optimal placement position; and using the method in conjunction with a method to minimize a cure time of the in-mold coating composition. The step of predicting a coating composition fill pattern in said mold is performed by determining the following: a) the relationship between a fluidity, S, of an in mold coating composition and a pressure gradient present in said mold, and b) the relationship between the coating thickness of the in mold coating composition and injection pressure. Zuyev and Chen, independently or in combination, do not teach or suggest the invention as set forth in the subject claims.

Particularly, as discussed more thoroughly above, Zuyev does not teach or suggest the step of using the fill pattern to determine optimal placement of a coating injection nozzle so as to minimize the flow time for an in mold coating composition to flow over at least a part of a molded article. Zuyev is directed to minimizing cure time, not flow time.

The Examiner further asserts that although Zuyev fails to teach that the step of predicting a coating fill pattern in the mold is performed by determining a) the relationship between a fluidity, S, of an in mold coating composition and a pressure gradient present in the mold, Chen teaches such features. The Examiner asserts that it would have been obvious to one skilled in the art to combine the teachings of Zuyev and Chen since Chen's teachings would have optimized the process of in-mold coating. Applicant respectfully disagrees.

According to claim 20, the step of predicting a coating fill pattern occurs over at least a two-dimensional surface. Therefore, the claim limitation that describe predicting the coating fill pattern must inherently also occur over at least a two dimensional surface. Chen explicitly states, "...the flow can be approximated as one dimensional." (page 2, col. 2, paragraph 3). As such, Chen's teaching in reference to the model cannot suggest the claimed limitation. The subject claim is directed to using a more realistic model for complicated multi-dimensional

geometry. Chen clearly states that such a feature is not within the current teaching.

Accordingly, for at least these reasons, Applicant/Appellant submits that the Examiner's rejection of claim 20 (along with claims 27-28 that depend therefrom) must be reversed.

V. Rejection of Claim 21 Under 35 U.S.C. 103(a)

Claim 21 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Zuyev in view of Chen as applied to claim 20, further in view of Ladeinde (A Procedure for Advection and Diffusion in Thin Cavities, Computational Mechanics 15 (1995) pp. 511-520, Springer-Verlag, 1995). Applicant respectfully disagrees for at least the following reason. Claim 21 depends from and includes all the limitations of independent claim 20. Ladeinde does not make up for the aforementioned deficiencies with regard to claim 20. As such, Applicant respectfully requests that the rejection be withdrawn.

VI. Rejection of Claims 25-26 Under 35 U.S.C. 103(a)

Claims 25-26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Zuyev in view of Chen as applied to claim 23, and further in view of Walsh. However, claims 25-26 depend from and include all the limitations of independent claim 20. Walsh does not make up for the aforementioned deficiencies with regard to claim 20. Accordingly, Applicant respectfully requests the Examiner to withdrawal the rejection of claims 25-26.

CONCLUSION

For the reasons detailed above, it is respectfully submitted all claims remaining in the application (Claims 11-18 and 20-28) are now in condition for allowance.

Respectfully submitted,

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April 27, 2009
Date

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